



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,342	10/14/2003	Randal W. Chance	MI22-2387	7186
21567	7590	12/29/2005	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			ROSASCO, STEPHEN D	
			ART UNIT	PAPER NUMBER
			1756	
DATE MAILED: 12/29/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/686,342

Applicant(s)

CHANCE ET AL.

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 1756

Detailed Action

After a telephone interview with Brent Kennedy and in response to the Remarks of 10/03/05 the examiner withdraws the prior office action rejections and includes new rejections here over newly cited art. And the time will be restarted.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The use of the phrase "suitable for attenuation" in the claim is unclear. The claim is to a method of converting a reticle by reducing a portion of the substrate, wherein it becomes suitable for phase shifting and attenuation at a longer wavelength. The reduction in the substrate is known to affect the phase shift, however, it is unclear if anything has been done to the mask to change its attenuation at the longer wavelength.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1-51 is rejected under 35 U.S.C. 102(e) as being anticipated by Babcock et al. (6,902,851).

Babcock et al. teach a method of testing the effect of-lights having different wavelengths on a layer of photoresist, comprising: providing a phase-shifting mask having a transparent material having first and second trenches, the first trench having a

Art Unit: 1756

first depth and the second trench having a second depth deeper than the first depth; transmitting light having a first wavelength through the first trench to the photoresist layer such that the light having a first wavelength is phase-shifted; transmitting light having a second wavelength longer than the first wavelength through the second trench to the photoresist layer such that the light having a second wavelength is phase-shifted; and comparing an effect on the photoresist layer of the light having the first wavelength to an effect on the photoresist layer of the light having the second wavelength.

And wherein the first depth is suitable for phase-shifting light having the wavelength of 248 nm by 180 degrees.

And wherein the first depth is suitable for phase-shifting light having a wavelength of 193 nm.

Babcock et al. also teach DETX (11):

Next, mask 26 is re-etched, whereby only second region 38 is etched in a fluorocarbon dry etch. Specifically, trenches 58 include a plurality of trenches 52 which are exposed during this second etch, trenches 52 being etched to a further depth during this second etch step. Trenches 52 are etched to increase the depth of the phase-shifting trenches to a depth suitable for phase-shifting of the longer wavelength. If a chrome layer is in place on surface 44, no further masking may be required, since the chrome layer will act as a hard mask. Alternatively, if no chrome is in place on second region 38, a second mask may further be required to perform the second etch step on trenches 52. This second mask would be patterned around trenches 52.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be

Art Unit: 1756

patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (6,656,645) in view of Babcock et al. (6,902,851) or Kokubo (6,627,359).

The claimed invention is directed to a method of converting a reticle from a first configuration suitable for a shorter wavelength of radiation to a second configuration suitable for a longer wavelength of radiation.

Tanaka et al. teach (col. 5, lines 19-33) a method of reclaiming a photomask comprising the steps of: (a) causing a mask user which uses a photomask to place an order with a blanks supplier for supplying photomask blanks for photomask blanks; (b) causing the mask user to manufacture a photomask having a shade pattern constituted by a resist film in an integrated circuit pattern region by the delivered photomask blanks; (c) causing the mask user to perform an exposure process by using the photomask; and (d) causing the mask user to sell the photomask subjected to the exposure process to the blanks supplier so as to reclaim the photomask as a photomask which can be used again.

The Tanaka et al. method comprises the steps of: (a) patterning and forming a first shade portion comprised of a resist film with an integrated circuit pattern on a mask substrate; (b) stripping the first shade portion comprised of the resist film with an integrated circuit pattern; and

(c) patterning and forming a second shade portion comprised of a resist film with an integrated circuit pattern on the mask substrate from which the first shade portion comprised of the resist film with an integrated circuit pattern has been stripped.

Art Unit: 1756

And comprising the step of: forming a mask information pattern in the mask substrate, which is formed by one or both of a trench formed in the mask substrate and a shade pattern comprised of a metal formed on the mask substrate.

The teachings of Tanaka et al. differ from those of the applicant in that the applicant teaches successive etching of the trench regions in the substrate in order to achieve phase shifting for a longer wavelength than the mask was initially designed for.

Babcock et al. is included here as described above.

Kokubo teaches (see claims) successive etching of the substrate for shifting for different wavelengths. Including a method of manufacturing a phase-shift photomask comprising the steps of preparing a substrate transparent to an exposure light having a wavelength λ and having a refraction factor n , forming, on the substrate, a pattern including a light-blocking portion blocking the light entering and a light transmission portion transmitting light, and etching the substrate on the transmission portion including a plurality of transmission sections so as to provide adjacent transmission sections, one having a recessed depth d_1 and the other one having a recessed depth d_2 so as to satisfy an equation of $(d_1 - d_2) = \lambda / 2(n - 1)$, the etching step comprises a first etching process of a selective dry-etching to the light transmission section of the substrate having the depth d_1 so as to provide a predetermined depth D_1 after the formation of the light-blocking portion, a second etching process of a wet-etching process to the transmission section having the depth d_1 so as to provide a depth of $\lambda / 2(n - 1)$, and a third etching process of a wet-etching to all the light transmission section having the depth d_1 and the depth d_2 so as to satisfy an equation of $(d_1 - d_2) = \lambda / 2(n - 1)$.

It would have been obvious to one having ordinary skill in the art to take the teachings of Tanaka et al. and combine them with the teachings of Babcock et al. or Kokubo in order to make the claimed invention because the primary references teach

Art Unit: 1756

that etching of a substrate to adjust the phase shift at different wavelengths, the use of attenuated phase shifting and its resulting pattern are well known in the art, and it would have been obvious to one to adjust the amount of light transmitted in conjunction with the phase shifting to produce the desired resulting pattern.

Applicant's arguments with respect to claims 1-51 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, elongated 'S' and a distinct 'R'.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
12/27/05